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The Influence of Realistic Mathematical Approach toward Students' Mathematical Connections Ability at Public Primary School 105366 Sei Nagalawan Serdang Bedagai.

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Abstract
The aims of this study are to examine: the influence of the Realistic Mathematical Approach toward students' Mathematical Connection Ability of grade V at Public Primary School 105366 Sei Nagalawan and the comparison of Realistic Mathematics Approach with Conventional Learning on the Mathematical Connection Ability. This research is a quasi-experimental study. The population in this study is all fifth grade students of Public Primary School 105366 Sei Nagalawan, consisting of two classes with the number of 55 students. Class V-A, 27 students is as an experimental class using the Realistic Mathematics Approach while the V-B, 28 students is as the control class using Conventional Learning. The instrument used consisted of: preliminary math ability test and mathematical connection ability test. The instrument is stated to have fulfilled the requirements of content validity, and reliability coefficient. The data are analyzed by Simple Regression Analysis Test. Before using Simple Regression Analysis Test, firstly the homogeneity and normality are tested in this study with a significant level of 5%. The average score of students' mathematical connection ability taught with realistic mathematics learning is 79.6 and the average score of mathematical connection ability taught with conventional learning is 72.0. Based on the analysis, the results of the study are: (1) there is an influence of the Realistic Mathematical Approach toward students' mathematical connection ability of fifth grade at Public Primary School 105366 Sei Nagalawan, (2) the mathematical connection ability of students who obtain a realistic mathematical approach is higher than students who obtain conventional learning.

Keywords: Realistic Mathematical Approach, Mathematical Connection Ability.

1. Introduction

In this modern era, there are several things that need to be prepared, including preparing human resources that are able to compete under any circumstances. Indonesia's human resources quality is still low compared other countries. Based on the *IMD World Talent Report 2015*, Indonesia gets 41st rank from 61 countries while in 2014, Indonesia got 25th rank. It means that it decreases. Indonesia's position is far below the position of neighboring countries such as Singapore , Malaysia, even Thailand. Indonesia's position is also only slightly better than the Philippines.

Human resource development is inseparable from education. Internationally, the quality of education in Indonesia, based on *Education for All Development Index*, Indonesia gets 51st rank out of 115 countries in 2015. In the 2015, the development program's latest report from United Nation, Indonesia ranked 110th from 187 countries in the Human Development Index with a number of 0.684. With that number, Indonesia still gets behind ASEAN's two neighboring countries, namely Malaysia (ranked 62) and Singapore (ranked 11).

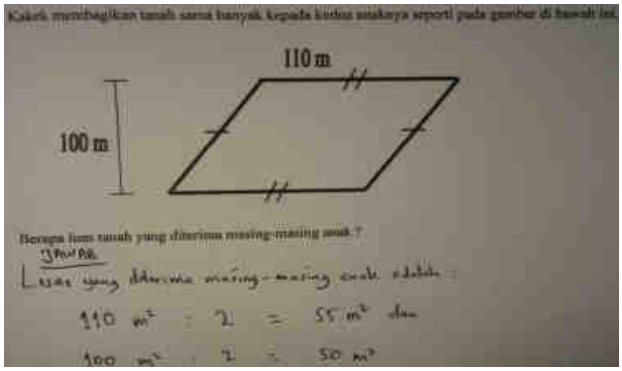
Especially in the field of Mathematics and Natural Sciences, according to TIMSS (Trends in International Mathematics and Science Study) conducted every 4 (four) years, started in 1995, but Indonesia was included in the TIMSS report starting in 1999, 2003, 2007, 2011 and 2015. Indonesian students' math achievement scores in 1999 ranked 34th out of 38 countries. In 2003, Indonesia was ranked 35th out of 46 participants. And in 2007, Indonesia was ranked 36th out of 49 participating countries. In 2011, Indonesia was ranked 36th out of 43 participating countries. In 2015 shows that the average Indonesian of the eighth grade students is ranked 35th out of 38 countries. From year to year, the mathematics learning achievement of Indonesian students is still at a low level based on the international benchmark TIMSS.

The low quality of Indonesian education is also shown by the Ministry of Education and Culture's Balitbang (2015) conducted by the OECD (Organization for Economic Cooperation and Development). Of the 76 countries that participated in the 2015 International Program for Student Assessment (PISA) program, all those who tested

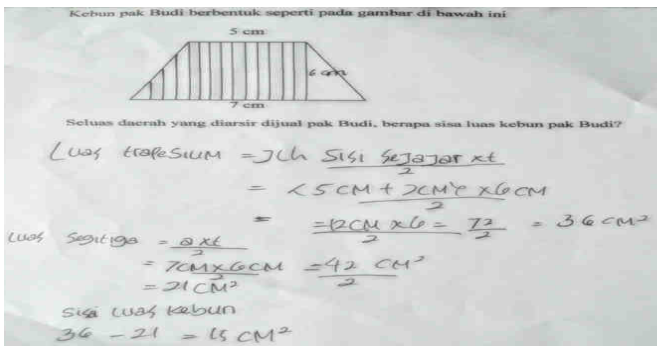
are 15-year-old students. Indonesia is ranked 69th which is far below Singapore (ranked 1), Vietnam (ranked 12th) Thailand (ranked 47th), even Malaysia (ranked 52nd) whose teachers are educated in Indonesia.

Teachers are school personnel who are directly in contact with students to provide guidance that ultimately results in the expected graduates. School is an educational institution where the formation of a person's character and personality. Besides being required to be the intellectual one, students must also be wise in their application in daily life. This is stated in *Law Number 20 of 2003* concerning the National Education System that the national goal of education is to educate the lives of the nation and develop Indonesian people as a whole, namely Indonesian people who are faithful and devoted to God Almighty and noble character, possess knowledge and skills. Physical, spiritual and health are strong and independent personality and a sense of community and national responsibility.
To be able to apply the education that students get to their daily lives, it requires connection skills. Kusuma in Rohendi and Dulpaja (2013: 18) states "the mathematical connection ability is the ability in presenting internal and external relationships of mathematics, which includes the connection between mathematical topics, the connection with other disciplines, and the connection in everyday life."

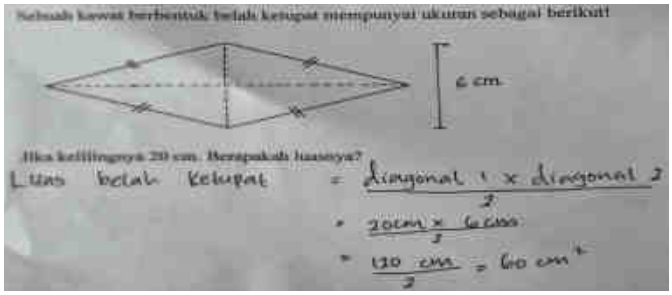
Mathematical connection ability is one of the abilities in introducing mathematical relationships, which are connections between mathematical topics, connections with other scientific disciplines and connections with everyday life. In this study the mathematical connection capabilities that are seen as influencing the indicators include; 1) use connections between math topics and 2) use connections in everyday life. The research conducted by Lugina and Handawati (in Bunga et al, 2016: 442) shows that the ability of student connections is quite low. Such a condition also occurs in 105366 State Elementary School Sei Nagalawan, especially in class five 2017-2108, this can be seen from the students' inability to answer questions related to mathematical connections. An example is the result of the work of some of the following students:



From the above result, it can be seen that the ability of students' mathematical connections in daily life is low because students have not been able to understand the questions connected to everyday life. From the students' answers, they did not know the connection between the area and the division. Students should have to calculate the area of land using the long-distance formula, the base multiplied by the height, then divide by two. It is reaffirmed in the following answer sheet:



Students are less careful in considering the size of each picture. After successfully obtaining the widthof Trapezoid correctly, students do not pay attention to the size of the base of the triangle above. The base should be obtained by subtracting the lower side with the top side of the Trapezoid.



The answer sheet above is wrong, the formula for finding the area is correct. But the ability to connect between topics / mathematical material is still low because students are not able to connect Pythagoras material with the width of Rhombus. Other diagonals that have not been known can be obtained by using Pythagoras formula based on the circumference, so that the above area formula of rhombus can be used that is multiplying both diagonals and dividing them.

The low connection capacity is due to the less optimal approach taken by the teacher in class when learning mathematics. Teachers tend to use a teacher-centered approach. Rusman (2010: 381-382) states that "the teacher-centered learning approach is learning that places students as objects in learning and learning activities are classic. This approach the teacher places himself as a person who knows and is the only source of learning.

The teacher-centered approach decreases the direct learning strategy that affects the results of education because students only do activities according to the teacher's instructions. This is reinforced by the results of observations conducted by researchers in State Elementary School Sei Nagalawan, students are only told to work on the problem based on the examples previously explained. The learning focuses on the achievement target of the material and does not pay attention to the activeness of students in constructing their knowledge through the experience of students because knowledge is not transferred directly from the environment to students, but it must be actively constructed by them. The self-constructed knowledge adds to the ability of students to survive (Geelan, 2006).This means that knowledge keeps them in the mathematical community and involved in mathematical activities.

Mathematical activities are carried out in a specialization process (specialization, paying attention to specific cases or examples), generalization process (generalization, focusing on more sample groups, searching for patterns and relationships), guessing (making guesses about problems encountered, predicting relationships and results) and beliefs (building beliefs about the understanding that has been built, looking for and communicating the reasons why something is true). All of these processes are carried out by those who perform a mathematical mind in the context of solving mathematical problems. This is in line with the opinions of Mason, Burton, and Stacey (in Sabri, 2009), mathematical thinking is a dynamic process that broadens the scope and depth of mathematical understanding. This is possible because it provides opportunities to increase the complexity of ideas handled from time to time.

Furthermore, Mason and his friends consider that mathematical thinking is as a procedural activity cycles with three phases: entry, attack, and review. These three stages are associated with emotional states: starting, engaging, thinking, continuing, building insight, being skeptical, and pondering. Of the three phases, what needs to be underlined is the entry phase because this phase lays the foundation for attacking, and the review phase is because this phase is often under-emphasized in the knowledge construction process, while it is the most laden phase of its educational content.

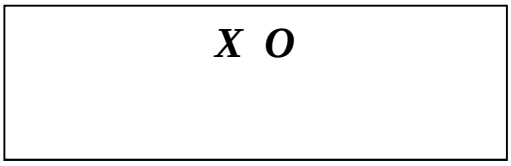
Conny says (in Sari, 2016) that one principle that activates students in learning is the principle of learning while working. Students are directed to the ability to use formulas, memorize formulas, while mathematics is only to work on questions, rarely students are taught to analyze and use mathematics in everyday life. As a result, when students are given an application or question that is different from the practice question, they will make a mistake. This contrasts with the Realistic Mathematical Approach, where students construct their own learning according to their own experience. Learning activities can use a particular approach as a teaching goal to

determine the success or failure of the desired teaching and learning process. (Rusman, 2010: 382). One of the obstacles for students in understanding mathematics today is the abstract object so that mathematics seems to be difficult to understand and apply to everyday life. One approach to learning that is oriented towards the application of mathematics in everyday life is the Realistic Approach.

Realistic Mathematical Approach is human activity and connects it to reality. (Lestari, 2017: 92). Realistic Mathematical Approach's philosophy according to Freudenthal (in Van den Heuvel-Panhuizen, 1996: 10) says "mathematics must be connected to reality, stay close to children and be relevant to society in order to be of human value". The point is that mathematics must be linked to reality, being close to children and relevant to society so that it is beneficial to humans. This means, mathematics must be close to students and relevant to real life every day. According to Van den Heuvel-Panhuizen (1996), if students learn mathematics apart from their daily experiences, students will quickly forget and cannot apply mathematics. Furthermore Freudenthal (in Gravemeijer, 1994: 20) says "the emphasis on mathematics as a human activity". That is to say the idea of mathematics is its emphasis on human activity. Mathematics as a human activity means that humans must be given the opportunity to reinvent ideas and mathematical concepts with adults.

II. Research Methodology

The study was conducted at Public Primary School 105366 Sei Nagalawan, Perbaungan District. The school has 9 study groups and 1 library. The reason of the researchers to choose that school as a place of research are: (1) there is no a study on Realistic Mathematics Learning yet, (2) researchers want to apply the new paradigm of learning where during this learning they tended to use the lecture method and centered on the book, (3) the school has a representative number of students to study. This study is conducted in the odd semester, taking place from September to November 2017. According to the class V lesson schedule, mathematics subjects are studied 4 times a week every Monday, Wednesday, Thursday and Saturday. The population in this study is all students in grade V at the school academic year 2017/2018, consisting of two classes with a total of 55 students. Class V-A has 27 students and V-B has 28 students. The type of research used was the One shot case Study. The design of the study is as follows: (Sugiyono, 2008: 110)



Explanation:
X = treatment given
O = Observation
In this study, there are differences in treatment between the experimental group and the control group. The experimental group is subjected to learning design with realistic mathematical approach, while the control group is subjected to ordinary learning design with conventional strategies.

III. Research Result

3.1. Research Result

The main objective of this study is to determine the effect of realistic mathematical approaches on students' mathematical connection abilities on the subject of Flat Build that received different learning. The data in this study are obtained from the results of instrument distribution in the form of mathematical connection ability tests, observation sheets of learning plans implementation, and Student Activity Sheets. These instruments are given to students class VA and VB . Class VB applies Ordinary learning and class VA applies Realistic Mathematics Learning. The results of the research on students' mathematical connection ability are analyzed using SPSS 22.0 for windows software. The analysis carried out in this study is descriptive statistical analysis and regression analysis.

The Measurement of the mathematical connection ability of students use KAM and post with the same subject matter. The implementation of Realistic Mathematics Learning activities both student and teacher activities occur in the classroom by using observation sheets. KAM questions and posts are given to each student in two classes, namely class VA which amounted to 27 students and class VB totaling 28 students, but VB grade

students, 1 student is not present when doing KAM and also giving treatment so that the number of research samples became 27 VA students and 27 VB students.

3.1.1. The Description of Research Data

Description analysis is carried out for both variables, namely, Realistic Mathematical Approach (X) whose characteristics consist of 1) Phenomenological exploration, 2) Using models and symbols for progressive mathematization (using models and symbols for progressive mathematics), 3) Using students 'own construction (utilization of student construction results), 4) Interactivity, 5) Intertwinement (linkage). The Mathematical Connection Ability Variable (Y) consists of indicator 1) the relationship between the material that has been previously studied with the trapezoid and kite material, 2) the relationship between the concept and the concepts contained in the trapezoid and the kite, 3) the relationship between trapezoid and kite in everyday life.

3.1.2.The Description of Preliminary Mathematical Ability

Before discussing the research data from the students 'mathematical connection ability test results, firstly discuss the results of students' preliminary mathematical ability tests. Students' Preliminary Mathematics Ability Test is used to determine the equality of the research sample class and to determine the mathematical abilities of students before learning takes place. Students' preliminary ability tests are taken from previous class questions about two dimension shape. The question is in the form of multiple choice questions with 10 questions. The preliminary ability test of students aims to find out the high, medium or low students' ability before the learning is carried out and it can be seen the changes in the preliminary ability of students, an increase or not. It is expected that after being treated, there will be changes, namely students whose ability as the basis for the formation of the initial group is low after being treated for changes to medium or high.

The complete calculation results can be seen in the Appendix, while the summary results are presented in Table 4.4 below:

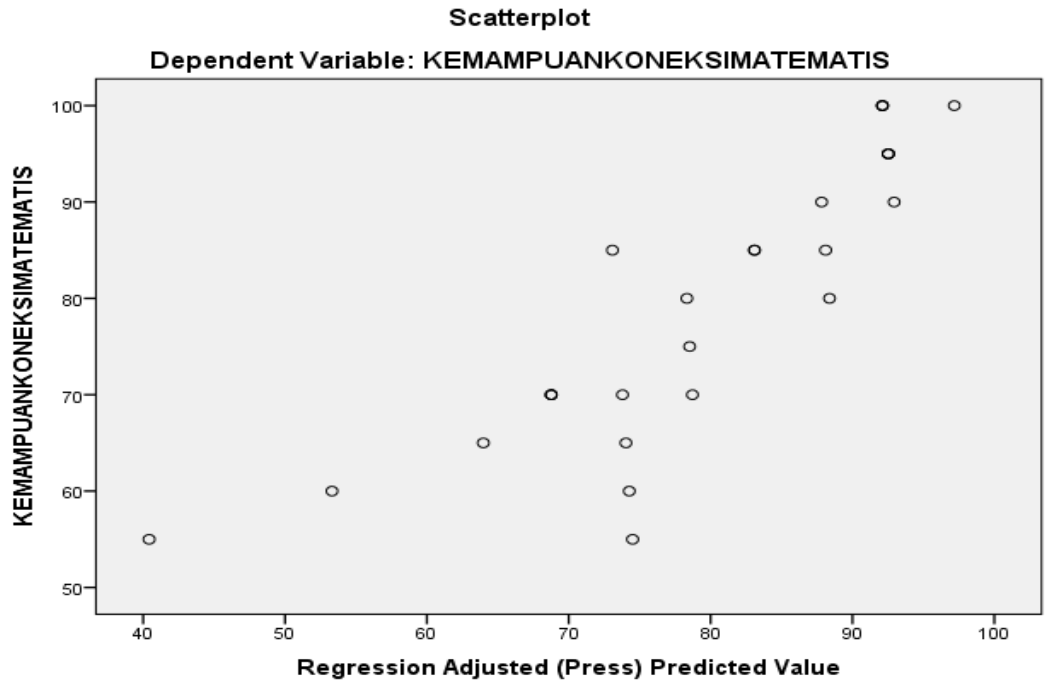
Table 4.4The Grouping of Initial Capabilities

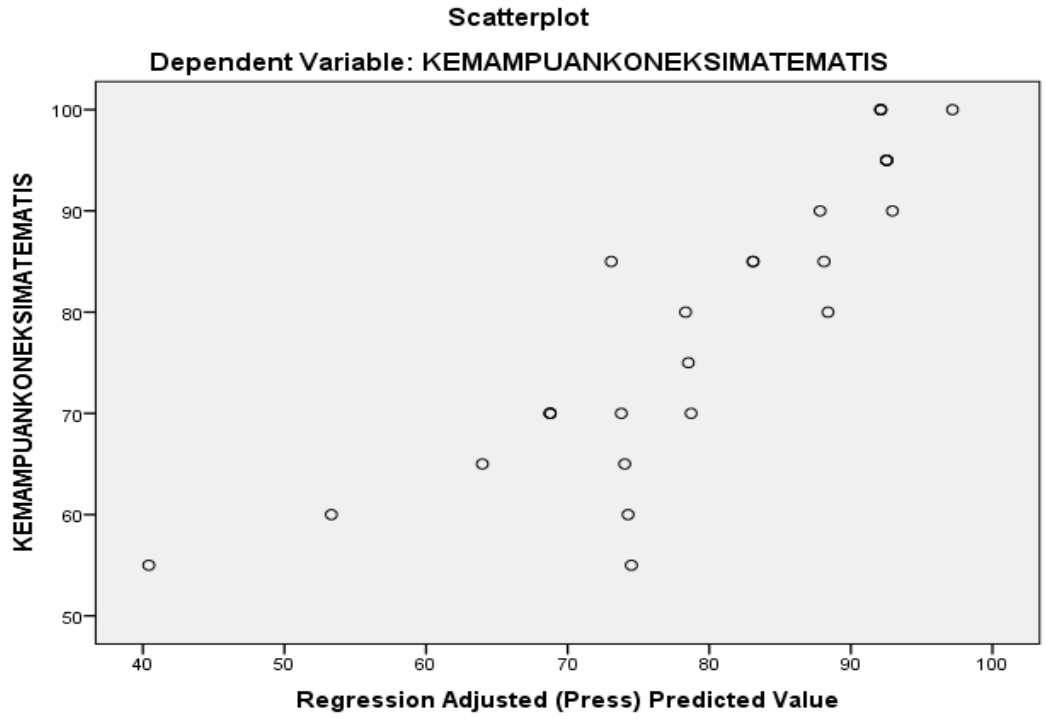
Sample of research	Students' ability		
	high	medium	low
Experiment class	4	17	6
Control class	5	19	3
Amount	9	36	9

Based on Table 4.4 above, it is found that the experiment class categorizes the student's ability, 4 students are high, 17 students are medium and 6 students are low, while the control class of student's ability is categorized that 5 students are medium, 19 students are medium and 3 students are low.

3.1.3. The Description of Mathematical Connection Capability

The Connection ability tests are conducted to determine students 'mathematical connection abilities after being given treatment. Overall, the average score of students' mathematical connection abilities learned by realistic mathematical approaches is better than the average scores of the overall mathematical connection abilities of students who are taught with conventional learning. From the problem solving process posttest, the overall mathematical connection ability can be described in the following diagram:





Based on the diagram, the data distribution values is located around a straight line. The curve shows that the data is spread around the diagram and follows the regression model so that it can be concluded that the data is normally distributed.

3.1.4. Student Activity in Learning Activities

Percentage of the average student activity in learning for each category of student activity during two meetings, the average percentage of student activity in learning with a realistic mathematical approach, namely: (a) understanding contextual problems 10.375%, (b) solving contextual problems 11, 07%, (c) compare or discuss the answers 10.02%, and (d) conclude 9.02%. By referring to the set criteria, the management of learning is said to be effective if eight categories of tolerance criteria achieve the effectiveness of the time used in ten items. It indicates that learning with a realistic mathematical approach is effectively applied.

3.1.5. Management of Learning with a Realistic Mathematical Approach

Based on the results of the observations, it is obtained that an average observation of the management of learning by using the Realistic Mathematical Approach. it can be concluded that the teacher's ability to manage learning meets the criteria for effectiveness. The teacher has tried well to apply the characteristics of a realistic mathematical approach. This indicates that learning with a realistic mathematical approach can be applied in mathematics learning on the subject of linear equations and inequalities of one variable and comparison.

3.1.6. The Observation of Students' Activities with Realistic Mathematics Approaches

From the results of the observations, it is obtained the average results of observations of student activities with a Realistic Mathematical Approach in accordance with the criteria of success that has been achieved, it can be concluded that the activities of students during learning meet the criteria for effectiveness. The teacher has tried well to apply the characteristics of a realistic mathematical approach. This indicates that learning with a realistic mathematical approach can be applied in mathematics learning on the subject of linear equations and inequalities of one variable and comparison.

IV. Conclusions, Implications, and Suggestions

4.1. Conclusion

Realistic mathematics learning influences students' mathematical connection abilities. Based on the formulation of the problem, research objectives, and research results as stated in the previous chapter, some conclusions are obtained as follows:

1. There is the influence of the Realistic Mathematical Approach toward the students' Ability of Mathematical Connections of Class V School 105366 Sei Nagalawan. This can be seen from the size of the constant (a) = 16,339 and the regression coefficient value (b) = 0,955 with t_ count = 9,371 and a significant level of 0,000 which is much smaller than 0,05.
2. Realistic Mathematics Approach is better than Conventional Learning on the Ability of Mathematical Connections in Class V Public Primary School 105366 Sei Nagalawan. This can be seen from the average score of the mathematical connection ability students taught with realistic mathematics learning of 79.6 and the average score of the ability of mathematics connections taught with conventional learning by 72.0. In addition, the value of R (correlation coefficient) is 0.882 while R Square (coefficient of determination) of 0.778 is the effect of X on Y. Thus, 77.8% of the mathematical connection values are influenced by realistic mathematical approach, while the remaining 22.2 is influenced by other factors and based on the characteristics of both learning. In ordinary learning models, students only solve problems based on the teacher's explanation through examples. In the learning of realistic mathematic approach, students use contextual problems through LAS so students must imagine the original form of the picture to be able to answer questions and understand them.

4.2. Implications

Based on the conclusions of this study, the implication is the selection of learning approaches by mathematics teachers. Mathematics teachers in elementary schools must have enough theoretical knowledge and skills in choosing a learning approach that presents contextual problems, able to turn students into more active, provide opportunities for students to construct their own knowledge.

Another implication that needs to get the teacher's attention is with a realistic mathematical approach students become active in expressing their opinions. Group discussions that occur make high-ability students help

students who have low abilities. Intergroup discussion made students more critical in responding to the work of other groups and in discussions there is reflection on the settlement that has been done in each group.

In solving contextual problems there is a form of completion of the answers. The class that uses realistic mathematical approach is better than ordinary learning. Students who learn using realistic mathematical approaches are more skilled at solving problems than students who learn using ordinary learning.

4.3. Suggestion

Based on the results of the research and conclusions above, there are some suggestions that need attention. These suggestions are:

1. To the teacher

a. Learning to use realistic mathematical approaches to mathematics learning that emphasizes students' mathematical connection abilities can be used as an alternative to apply innovative mathematics learning, especially in teaching the width of Kites and trapezoid

b. In ordinary learning the teacher should be able to provide more motivation to students to be able to invite students to emphasize "process of doing mathematics" by giving an activity sheet that is done by the students themselves. Whereas for students who use ordinary learning it is expected that with the provision of LAS provided the teacher is more motivated and has a sense of responsibility to complete the LAS. The teacher can also reward students in the form of praise, additional grades, or small prizes at the end of learning.

c. The time when working on LAS requires quite a lot of time, so to improve this, it is expected that the teacher can divide heterogeneous learning groups. So that students who have high math skills can teach students who have moderate and low abilities that make the interaction of fellow students increasingly active through group discussions.

d. Among the three indicators of mathematical connection ability, connection with everyday life (the real world) is an indicator that always has the lowest average score of research results. Therefore, teachers should be well prepared especially the media so that the average score of research results on the indicator of connection with the real world can be higher.

e. In making the questions of each indicator of mathematical connection ability, the teacher should ask people who are more skilled / understanding because connection ability is one of the higher-order thinking skills that makes the questions for elementary school students rather difficult, especially on indicators of connection with other disciplines because of mathematics. Elementary school is very rarely even connected with other disciplines.

f. In each learning teacher should create a learning atmosphere that gives students the opportunity to express mathematical ideas in their own language and ways, so that in mathematics learning students become brave in argumentation, more believing and creative.

g. It is expected that teachers need to add insight into learning theories and innovative learning models in order to implement them in mathematics learning so that conventional or ordinary learning can be consciously abandoned as an effort to improve student learning outcomes.

2. To related Institutions

a. The Realistic Mathematical Approach by emphasizing mathematical connection abilities is still very rare to teachers and students, therefore it needs to be socialized by the school or related institution in hopes of improving students 'mathematics learning outcomes, especially improving students' mathematical connection abilities.

b. The Realistic Mathematical Approach can be used as an alternative in improving students' mathematical connection ability on the broad topic of kites and trapezoidal so that they can be used as input for schools to be developed as an effective learning strategy for other mathematical subjects.

3. Advanced researchers

a. Further research can be carried out with a realistic mathematical approach in maximizing students' mathematical connection capabilities maximally to obtain maximum research results.

b. Further research can be carried out with a realistic mathematical approach in improving the ability / other mathematical aspects by applying deeper so that the implications of the research results can be applied in schools.

References

Bunga.N and Atun, I. 2016. *Realistic Mathematics Education Approach to Improve Students' Mathematical Connections*: Scientific Pen Journal, Vol. 1, Number 1.

Hasratuddin.. 2015. *Why Must Learn Mathematics*. Medan Perdana Publishing.

Karaca, Y and Ozkaya. 2017. *The Effects of Realistic Mathematics Education on Students' Math Self Reporting Fifth Grades Mathematics Course*. International Journal of CurriculumandInstruction (IJCI)

Lestari, L. 2017. *The Effectiveness of Realistic Mathematics Education Approach on Ability of Students' Mathematical Concept Understanding:* International Journal of Science Basic and Applied Research. Vol. 34,

Schunk, D. *Without Years. An Educational Perspective Learning Theories*. Translation by Eva Hamdiah. 2012. Jakarta: Student Library.

Saragih, S. 2015. *SPSS Application in Educational Research Statistics.* Agriculture Prime Publishing.

Veloo, A, et al. 2015. *The Effect of Realistic Mathematics Education Approach Among Pubic Secondary In Riau*. Australian Journal of Basics and Applied Sciences.